

No 31

31	Diseases of Econ Plts
----	-----------------------

BOTANIC GARDENS.

Singapore.

DISEASES OF ECONOMIC

PLANTS.

F31/1

Personal.

G.B. Dehnbach.

COLOCASIA. ESCULENTA. (ALU. OR KESDAL).

Leaf spot :---- It was found to have a havoc in the plot and there was a leaf shed to an enormous extent. All varie were found to be attacked by the leaf spot disease. The spots are in their earlier stages small roundish spots dark in colour. As the fungus develops its tissues the spot gets brownish appearance with concentric rings. Of the outer -- zones one is whitish and that is the reproductive part of the fungus. The spots coalesce together and the leaf curls and has a parched appearance. After sometime the leaf sheds itself.

J. H. P. leaf

Microscopic examination of leaf sections

Epidermal view

dried leaf under microscope

Stomata

Epidermis

germinating

haustorium

spores

The fungus is *Ptythophthora Colocasia*. The dried leaf shows many SPORES on the epidermis. The fungus is epider-intercellular with small slender unbranched haustoria as seen in the diagram.

The spores germinate very rapidly in gelatine solution. and hyphae. is produced from one end. It is unseptate and protoplasma can be seen migrated in the same. The spore in solution swells up. Haustoria are also seen in artificial culture of the fungus. The spores are formed on the outside of the leaf, the sporophores emerging out through the stomata.

(II)

Eniclatting of the leaves of the plants /Colocasia.)

Leaf spot. The spot begins as a rule in the majority of cases from the edge, but in some cases it gets up from the middle of the leaf.

First the edge gets for a certain length yellow, and then it spreads inside causing irregular brown spots. ~~xxxxxxx~~
All - old and young leaves as well are attacked. On the dried surface can be seen the reproductive parts of the fungus.
Dark black dots with small setae. the

Spore one-celled.

Microscopic exam.

This spore on germinating appears to be two celled. with one single germ tube at its

end.

In the dried zone can be seen small dots with appendages.
The spores are hyaline and one-celled, and show appressoria on germination, at the end of the germ-tube.

BRINGAL FRUIT-ROTT

The fruit is attacked by a fungus. *Vernicularia capitata*. The

The fruit on the tree is quite healthy but after sometime it develops the same, first in patches which then extend and cover the whole skin. The fruit goes on rotting and the whole is a putrid mass of rotting. The calyx is also found rotting.

(C.F. Butler. pp. 505--- 550)

Microscopic examination.

patches of skin showing pycnidia

spores — Pycnidium

spores

spores germinating & dividing into two cells on doing so

Remedy:--- Plucking fruit and destroying the same. Spraying is found to be effective. This disease is found to spread in wet weather. and it is prevented by the dry weather, the hot season.

The disease is said to enter the seed as in the case of the bean.

CARICA PAPAYA. (PAPAYA , Pápua.)

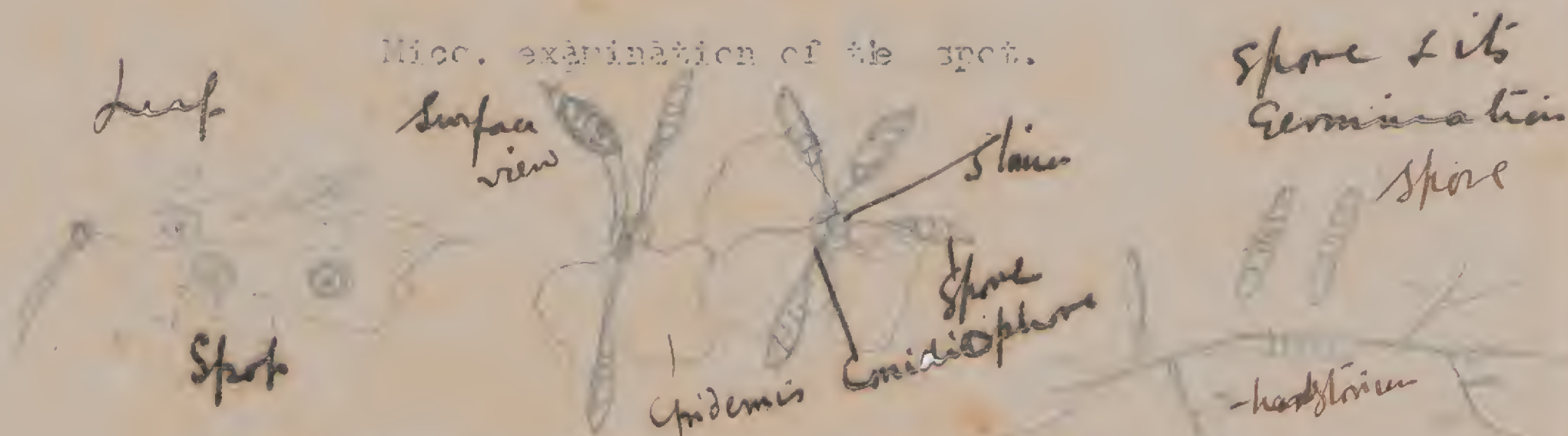
Leaf spot :--- Seedlings.: The seedlings in the boxes were attacked by a *Cercospora* spp. The old lvs. are the first to catch the infection and then it spreads to the younger lvs.

The seedlings in their growth by the disease were a lot of leaf shedding. The old lvs. on being removed were burned away. This stopped the spread.

First, there is discoloration of the leaf in a particular place and then it turns gradually full in colour and finally there is a regular spot with concentric rings of brown colour with a centre of white spot. This is the reproductive part of the fungus. The spots coalesce and the leaf curls and gives the parched appearance.

Grown up plants.: The same disease is also observed in them. The lvs. down below are attacked first, and then the fungus goes up if the lvs. are not cut and removed.

Mico. explanation of the spot.



There is another disease. It attacked the buds as well the fertilised fls. The buds dropped and so did the fls. The petals of the buds show the same disease. The fungus, it seems enters through them. Inside on the ovary, can be seen depressed cankers and rotting. In dropped down fr7. there is distinct discoloration in the basal portion of the fr7.

This reduced the crop and so did the crossing experiments.

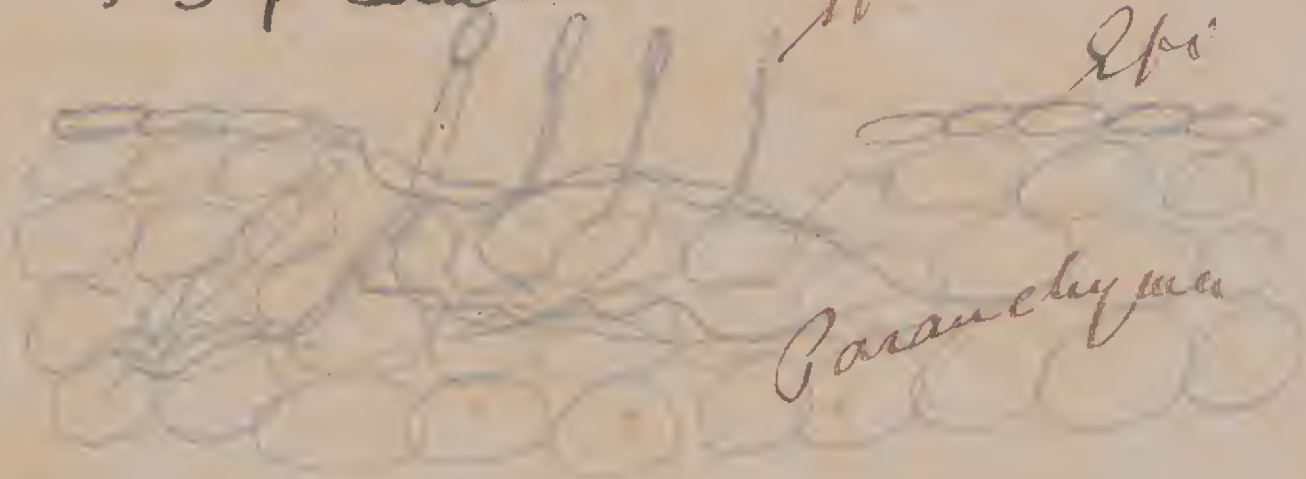
REMEDY TRIED.:--- Spraying with Bordeaux mixture. (normal).

Name of the fungus doubtful probably a
Gleosporium sp.

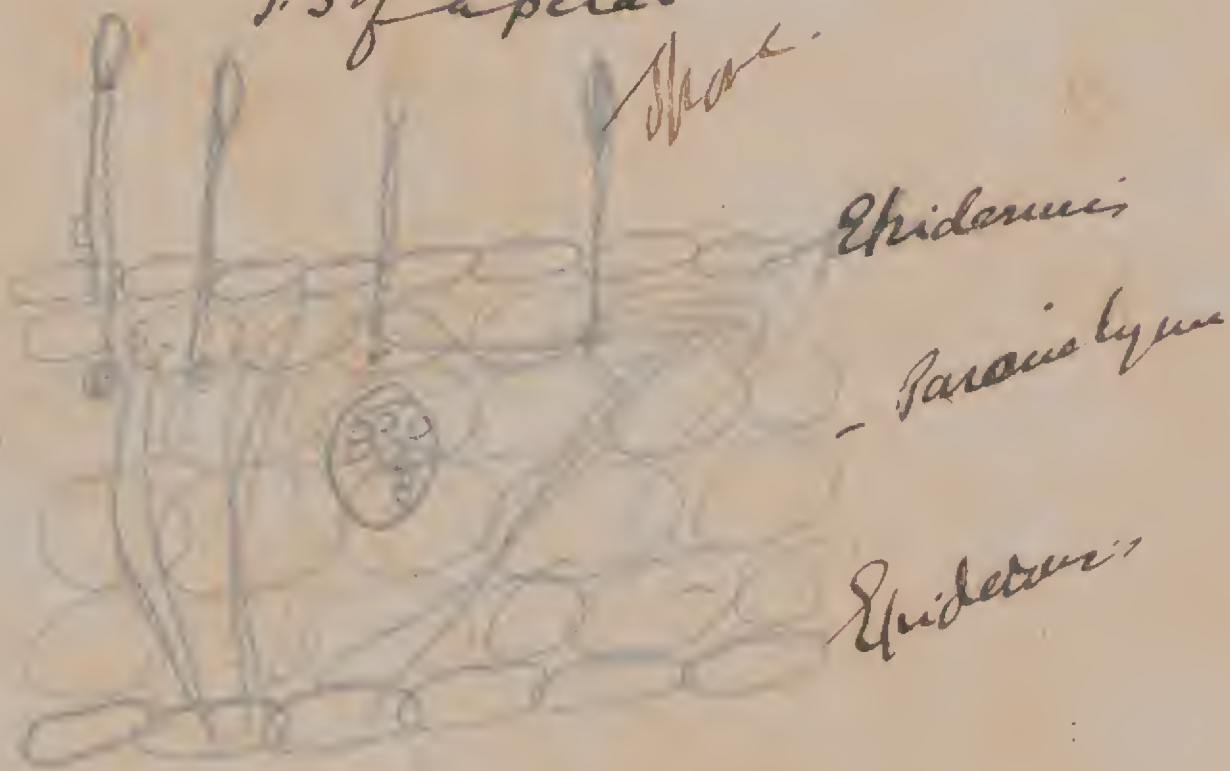
Microscopic Exam of the fruit & the
cankers:

T.S of Canker. *Spore*

very much
Cankers.



T.S of a petal. *Spore*



The flowers show this coloration on the petals and the fl.
sheds down. The fungus arrests the development of the fruit.

The bud does not bloom but fades. The colour changes from
greenish white to dull yellow. At the same time, the inside
of the petals can be seen cankers. The fruit then rots and
the whole stuff is a loose stuff. The petals become
parched and the section shows the fungus.

Two types of spores are found: One unseptate and the other
with two, called.

This fungus seems to be a *Gleosporium* sp. from the

Nature of the cankers & the nature of the ascospores.

~~It is not a new species.~~

Inoculations with leaf spot on leaves & the
effect is the same. Same result. That is *Cercospora* was
found to cause the same rot.

The disease may be called "the Anthracnose" of the fruit.

The spots are round with a raised point in the centre. This is the reproductive part of the fungus.

The fungus was found to attack ripe fruits also. In the first place they were quite healthy but after a few days I found that it was rotting horribly.
Remedy: Fruits after being plucked were sprayed with - B.M. They died quite well though injured in certain places.
Anthracnose on the stem.

One plant in the mango plot is attacked by a fungus.

Colletotrichum spp. There is brown coating on the stem which corrodes the stem. The top is killed by the fungus by obstructing the water supply.

Cercospora is also found on the stem. This seems to have migrated from the leaves. The stem under the fungus is decaying fast. Micro. exam.

Brown stripe

asexual



The above noted disease seems to be common, it has destroyed in all three plants. It is noted to be that it makes itself conspicuous in the middle of the stem. The growth stops and the trees succumb. The discoloration due to the hyphae is noted & up to the roots. (sent for identification).

Black rust on the petioles. (drying and partially dried.)

Diplodia sp.

Papaya seedlings rot. :---

Papaya seeds were sown in two pots. The seeds did germinate but after a few days it was noticed that they were dying/(just rotting at the base.) In one pot, the attack was very severe but in the other, not to the same extent.

The fungus attacks the plants at the level of the surface. and as a consequence the seedlings die.

Micro exam.

Remedy :--- the soil was disinfected with H_2SO_4 (see gardens. Bul.) and seeds sown.

Papaya (contd)

In the fruit plantation, a few of the grown up plants were wilting . In order to see the origin of the injury , the plant was submitted to thorough exam. Nothing was noted on the lvs. or the stem except at the soil level. The stem was rotting at that point and was coal black. The root development was abnormal. One thing I noticed was that a lot of raw manure was put underneath of the plant.

Micro. exam.:--- Sections cut from the rotting showed fungus mycelium peculiar to the Rhizoctinia spp. (clamp connections.)

point.
where the fungus
attacks the
blant.

Banana. (musa sapientum).

Banana is subject to two diseases. 1. leaf spot (*Exstirochis* spp.)
2. Macrophoma spp. small black dots on the leaves.

Leaf spot. This is caused by a fungus very virulent on the plant
the rings
The spots are generally elongated and ~~xxx like~~ after the fashion
of potato starch. The spots when many join together and cover the
whole leaf, it being a mass of parched matter.

The colour of the spot is first dull brown and then it ~~xxx~~ turns
dark brown with black dots on the same. This is the spore mass
of the fungus. Old lvs. are more subject ~~than~~ the young lvs.

Leaves cutting and burning.

Spraying seems to check the disease. (poudeaux.)

Micro. exam.

affected leaf

mature spores

Immature spores



The spores are found in mucovulii and raised on stalks.

The immature spores are unicellular with two appendages on the top
while the mature ones have ~~xxxx~~ four or more cells, the mid cells
being brown the top/ones colourless, with two hairs on them.

2. *Macrophoma nassa*.?— This is said to be a saprophitic fungus. and is found on lvs. (as far noted here.

The small black dots on the leaf are the pycnidia of the fungus.

Micro. Exam.

2710

Beans. (*Phaseolus lunatus*.)

This plant is subject to a lot of diseases. The following are noted .:---Leaf spot ~~Stems~~ *colletotrichum lindemuthianum* .

this is found on all parts of the plant/ . 2. *Vermicularia* spp.
die back. 3. *Sclerotium*. spp.

Anthracnose of bean.:--- This is the worst sort of disease the gardener has to fight with. It attacks all the parts of the plant except the roots . Well selected beans which showed no signs of any discolorations develop this disease. This seems to lodge in the cotyledons and in the primary shoot and whence it migrates up into the leaf and pods and especially mature pods, and pods on old plants. (standing in the plot for a long time.) Compare the old plants and the young newly planted beans.

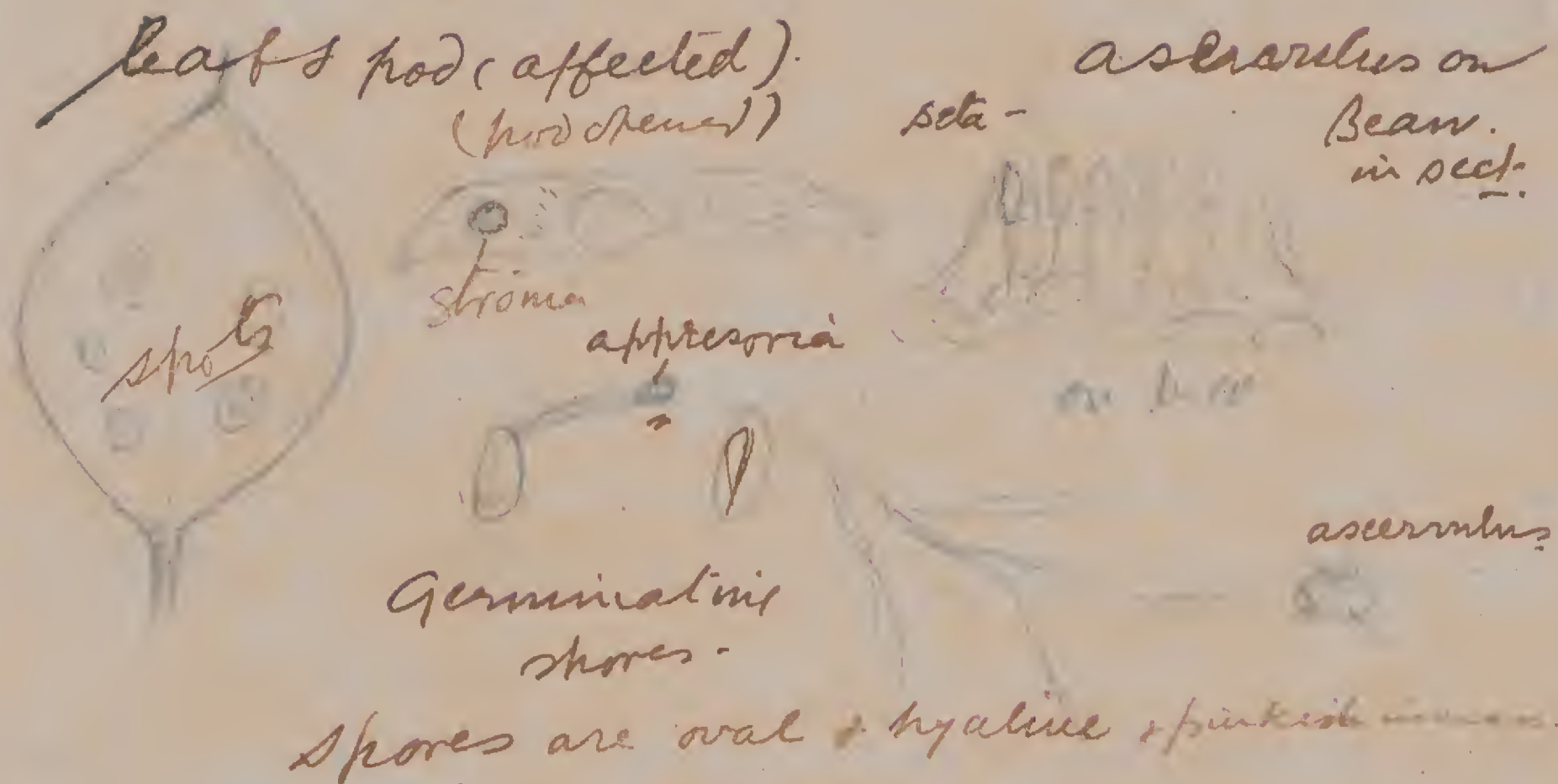
Symptoms :-- These are shown by /spots sometimes cankers(rotting) this is more noticeable in rainy season. and wet ~~stagnant~~ weather. On leaves small white parchment like ^{or copper coloured} spots (drying and then shedding) are noticeable. On pods they are observed as brownish specks. This speck has a cushion like pad down in the pod. This is due to the vigorous growth of the fungus. -- stroma-- . ~~Thus~~ The fungus develops its reproductive parts are long if the weather is suitable moist weather. ^{Black spots} dots in the spots show the ascervuli of the fungus,, in which are found to be the spores of the disease. The fungus enters the seed through this stroma which makes a dwelling place of the fungus spores.

This has done a great deal of damage to the crop and hence rigid selection as regards seeds is essential.

Bordeaux gives good results. Burgundy mixture has given ~~also~~ satisfactory results.

A strain, coloured coated bean seems to be less susceptible to the
this fungus. A cross may produce a resistant variety.

Micro. exam.



Phaseolus tetragonolobus
Four edged bean. (*Phaseolus tetragonolobus*) ..

This plant is found to be a prey to fungi— 1. Rust.
and second on flower.


Uromyces appendiculatus?:— This is only found on this plant
and not on the allied species though they are growing side by side.
The fungus attacks the leaves, the pods ~~xxxxxxxxxxxxxxxxxxxx~~

The leaves crumple and curl on the sides. the fungus generally
is observe on the lower side of the leaf. First, pustules —
orange coloured and shining are noted and these burst and liberate
the spores. — orange powder. This ^{is} found on the pods also.
Does much damage .

No remedy is tried.

Micro exam.

attached leaf + bean


 Malice spores on conidiophores
shores off from conidiophores
orange coloured with thick pointed
apophyses

Groundnut, pea nut.

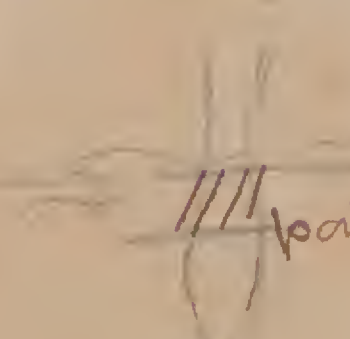
Ground is attacked by the following fungi:---

Rhizoctonia, spp. (rot); Leaf spot. *Cercospora personata* a. (not observed by me.) *Septogloeum arachidis*.
pre. Baker.

Rhizoctonia spp:--- This fungus attacks the plant in its early as well as late stages. This soil fungus first starts from the roots upwards. The tissue at the soil level become flaccid and papery and nothing remains but a few threads of the bast fibre. The consequence is that the lvs. dry and the whole seedling or the plant as the case may be, dies. Micro. exam. shows the fungus mycelium peculiar to the species.



point of rotting
Soil level



soil level
point of attack

Leaf spot disease. :---

This seems to be the common leaf spot on the plant.

The causal fungus is *Septogloeum arachidis*. It produces large round or a little elongated spots which are brownish black in centre in the centre and surrounded by a sharp black line and then a diffused yellow ring merging into the healthy tissue. They occur especially on the lower and older leaves, and they drop before maturing.

There is a lot lvs. falling, diminishing the crop.

Micro. Exam.

Dioscorea spp. (Yucca)

Dioscorea

Zea mays. (Maize) ~~tax~~.

Maize is observed to ~~exhibit~~ be a prey to a leaf spot fungus

Helminthosporium.

--- This seems to be a very

bad disease of the crop. It produces long elongated spots which first begin as small yellow oval or round spots. They then elongate and run along the side of the veins of the leaf. The mid rib limits the spread. Thus they cover the whole leaf lengthwise.

The leaf is discoloured ~~xxxxxxx~~ first redish and then yellow ~~xxxxxx~~ when it dries up. The spore mass can be found in greenish powder on the spot observed only in suitable weather. This shows the spores of the fungus.

The plant is stunted and produces very small cobs, and matures too early.

Stripping off the leaves.

affected lvs.

Micro. exam.

spots

elongated

mature spores.

immature spores.

byaline thick walled.

androphores

thick walled 4-5 septate & brownish in colour.

Curved spores are also found.

Rice.

Helminthosporium sativum? :--- This is found on rice heads and on the leaves. The black powder on the grain and on the sheathes show the spores. The fungus seems to retard the development of the grain the husk. (No seed was observed).

Specimen from Malacca.

Micro exam.

Spores.

Spore germinating

Spores are with thick walls. Some are without walls, which some are curved.

These germinate by producing two germ tubes from both ends or from ^{one} either end.

Black powder →

Theobroma Cacao. (Cacao.)

The cacao fruit is attacked by

Coffee.

This estate crop of the many tropical countries is subject to the following diseases:----- coffee rust(*hemilia vastatrix*), coffeespot. (*pestilozzia coffee*), phyllosticta,

Coffee rust.

This is the most common disease of the plant and dates from a long time. This is the most virulent of the diseases on coffee, and is accountable to great losses to the planter.

The fungus as a rule occurs on the lvs. but it is noted on tips of young branches and on berries. The primary symptom of the attack is a yellow spot on the back of the leaf, the colour is intensified by the growth of the fungus day by day. On its full development, the spot is covered with orange powder, the spores of the fungus. On the upper surface there are no signs of the spots first but late on brownish patches are observed. The spores are not observed on the upper surface. These spots grow wide by joining, but their spread is checked by the veins for a time. When the attack is severe the whole turns brown and dry. This disease is not very virulent on the plants on the Bot. Garden, only a few showing spots. (checked by spraying.)

It is more markedly observed on the young lvs. than on the old lvs.

Remedy.:----- spraying is satisfactory but it is said not to be so effective. Rust-resistant varieties are those shd. be tried.

Micro. exam.

affected leaf

Spores mature

Immature section

OO

(2) *Pestilencia. seffera* :--- This is very common on the plants in the Gardens. and causes what may be termed leaf seffera. The spot first takes its appearance on the upper surface and spreads rapidly on the leaf. Several spots join and give the leaf the appearance of the seffera. The rings peculiar to this fungus are noted in the spots, which are covered with small dots the ascervilli of the fungus. The characteristic spores of the fungus are found in the dots.

There is a great leaf fall and the growth of the plant is checked to a great extent.

Remedy tried. :--- The affected leaves with the bearing branches are burnt. Bordeaux is sprayed.

Micro. exam.

Imkatingthas

affected leaf

*Malin
Shas*